Title: PRE-FABRICATED CLADDED PIPE SYSTEM IN COMPLIANCE TO FSB/PSB/001/00

Background:

Field of the Invention

The present invention relates to fire rated wrap type cladded pipe system and more specifically it relates to a fire rated wrap cladded pipe system that can be pre-fabricated off site.

Description of the Related Art

Any discussion of the prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of common general knowledge in the field.

The cladded pipe system shall comply with FSB/PSB/001/00 Fire Resistance Test, as part of the Fire Safety and Shelter Bureau's Code of Practice For Fire Precautions in Building (as know as Fire Code). The cladded pipe system shall be tested and certified for use in accordance to Fire Safety Guidelines (FSG 1:2008) Certification of Regulated Fire Safety Products / Material.

Cladded pipe system is required for Fire Hydrant System, Rising Main, Hose reel System and Automatic Fire Sprinkler System in building where the pipes are to be protected with fire resistance construction complying with Fire Code, SS575 Code of Practice for Fire Hydrant, Rising Mains and Hose reel Systems and CP52 Code of Practice for Automatic Fire Sprinkler System.

The existing market available product having the method of installing fire rated cladded pipe system was to

- 1st step, hang the pipe
- 2nd step, construct the back-bone support frame for the board using U channel and angle bar
- 3rd step, packed the rockwool / mineral wool tightly into the fame cavity
- 4th step, cut the board into dimension and secure the board onto the back-bone support frame using a tapping screw
- 5th step, patch up any gaps, openings, crack lines and exposed screw head with fire cement mortar

Typically, board type system is used as fire rated enclosure system complying with FSB/PSB/001/00. The conventional board type system installation is done after the pipe installation is completed. Thus, pre-fabrication of the cladded pipe system is generally impossible. Installation of the fire rated enclosure is done on site that is labour intensive, and at height, resulting in construction safety risk.

Depending on the material and installation details, the fire rated enclosure can take weathering condition. However, such system is usually costly and/or is much heavier compared to the normal board type fire rated enclosure system. Weather damage may occur; due to unplanned weather condition or unsuitable material is used.

While the fire rated enclosure system may be approved for use in building, complying to Fire Code, installation can be very time consuming due to construction site condition.

The fire rated wrap cladded pipe system substantially departs from the conventional concept and designs of the prior art and provide a solution for pre-fabrication of fire rated pipe enclosure for building construction.

Brief Summary of The Invention:

In view of the material and installation disadvantages inherent in the known types of board type fire rated enclosure mentioned in the prior art, the present invention provides a more robust, slimmer and pre-fabricable cladded pipe system which can be used for building construction for a more economical, labour reducing and safer installation.

The general purpose of the present invention, which will be described subsequently in greater detail, is to provide a new cladded pipe system that has better performance, thinner and pre-fabricable features which is not anticipated, rendered obvious, suggested, or even implied by any of the prior art cladded pipe system.

To attain this, the present invention used a fire-retardant wrap and polymer layer around the pipe to form a cladded pipe system.

There has thus been outlined, rather broadly, the more important features of the invention in order that the detailed description thereof may be better understood, and in order that the present contribution to the art may be better appreciated. There are additional features of the invention that will be described hereinafter and that will form the subject matter of the claims appended hereto.

In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. It is to be understood that the phraseology and terminology employed herein are for the purpose of the description and should not be regarded as limiting.

A primary object of this invention is to provide the cladded pipe system that overcomes the shortcomings of the known prior art products.

A secondary objective is to provide a cladded pipe system that is pre-fabricable.

Another objective is to provide a cladded pipe system that requires lesser space requirement than the known prior art products.

An additional objective is to provide a cladded pipe system that requires lesser weight requirement than the known prior art products.

A further objective is to provide a cladded pipe system that is able to take tropical weathering condition.

Other objects and advantages of this invention will become obvious to the reader and it is intended that these objects and advantages be within the scope of the invention.

To the accomplishment of the above and related objects, this invention may be embodied in the form illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that changes may be made in the specific construction illustrated and described within the scope of the appended claims.

Description of The Drawings:

Various other features and advantages of the invention will become fully appreciated as the same becomes better understood when considered in conjunction with the accompanying drawings, in which like reference characters designate the parts throughout the view, and wherein:

Figure 1 is a 3D perspective view of the invention

Detailed Description of the invention

A. Overview

Turning now descriptively to the drawings, in which similar reference characters denote similar elements throughout the several views, **Figure 1** – illustrate a cladded pipe system, which comprises a pipe **1** being protected by fire-retardant polymer layer **2**, fire-retardant wrap **3**, overlaying fire-retardant wrap with fire-retardant polymer layer **9** protecting the pipe joint, supported by a C-channel or pipe hanger and strut rod **10,** secured to the soffit/wall/floor of the building and penetrating through the wall **11** which is protected by a layer of fire-retardant wrap with fire-retardant polymer layer **6**, wall mounted using a bolt, washer and wall anchor **8**.

B. Fire-retardant polymer layer

The fire-retardant polymer layer **2** is a composition of fire addictive and polymers make up to a thickness of 9mm. It's then laid onto the fire-retardant wrap **3** to act as a medium to prevent convection heat wave penetration built up from the fire source. The fire-retardant polymer layer's function is through expansion when in contact with heat, create a complete seal or insulation between the pipe **1** and the fire-retardant wrap **3**.

C. Fire-retardant wrap

The fire-retardant wrap **3** can be either type of a non-combustible fabric with coating of fire-retard agent or a ceramic / silica fiber encapsulated with a reinforced aluminum foil blanket. It should serve as a first-degree heat protection directly from the fire source and it also serve as a support or restrain layer to the fire-retardant polymer layer **2**. Cupped head welding pin 4 throughout the pipe secures the fire-retardant layer tightly. All joint edges shall be seal using fire-retardant polymer **5**.

D. Overlaying of joints using Fire-retardant wrap with Fire-retardant polymer layer

Another layer of fire-retardant wrap with fire-retardant polymer layer 9 shall overlay every joint on the pipe, regardless of a pipe joint or fitting joint, and secured tightly by steel band and buckle **7**. All joint edges shall be sealed using fire-retardant polymer **5**.

E. Wall Penetration

Every wall **11** penetrations by the pipe are crucial as this mark the fire penetration rate from one fire compartment to another. The fire rating requirement, depending on the building design, varies from 1 hour to 4 hours. With regards to the invention, the wall **11** penetration shall be protected by a layer of fire-retardant wrap with fire-retardant polymer layer **6**, wall mounted using a bolt, washer and wall anchor **8**. The installation will have more than 4 hours of fire rating and insulation from one fire compartment to another.

F. Pre-Fabrication of Cladded pipe system

The fire rated wrap cladded pipe system can be pre-fabricated in factory using automation machine such as industrial mixer for mixing fire addictive and polymers. The mixture is transferred to a pug mill machine for extrusion to required dimensions as a final product of fire-retardant polymer layer **2**.

A machine precut the fire-retardant wrap **3** to the predetermined size and convey through conveyor belts to prepare for laying of fire-retardant polymer layer **2**.

Upon laying of fire-retardant polymer layer **2** onto fire-retardant wrap **3**, it will be transferred to a bench press where it will be wrap around the pipe **1** and secured by cupped head welding pin **4** using a welding gun. The completed pipes are ready to be delivered to construction site.

Delivery to site can be in accordance to construction site installation schedule and quantity. This will avoid site storage issue (manpower, security, space requirement etc). Installation of the cladded pipe system in construction site shall follow the below method statement;

- 1st step, hang the fire rated wrap type cladded pipe and ensure that the pipe is properly secured
- 2nd step, overlaid joints by another layer of fire-retardant wrap with fire-retardant polymer layer **9** and secured it tightly by steel band and buckle **7**. These overlaying layers can also be pre-fabricated in the factory and send over as a finish product.

As illustrated above, the invention had remarkably reduced the time and labour for installation from a 5-step installation of a prior art product to a simple 2-step installation. There are additional advantages such as improved safety, risk reduction, increased productivity, mitigating space constraints when working in congested M&E areas, reduced wastage of materials; improved workers ergonomic aspects and conditions while working at height, handling heavy materials and working positions.

This invention further increase the profit margins with reduced labor costs, reduced material wastage and time incurred on completing the work is substantially reduced.

I claim:

1. A cladded pipe system, comprising:
   a pipe that is required to be protected;
   wherein said the pipe is required to be protected as per required in the building design as per Fire Code requirement, Singapore Civil Defense Force or by-law.
   a fire-retardant polymer layer laid on the pipe;
   a fire-retardant wrap, wrapping the pipe and fire-retardant polymer layer;
   a overlaying fire-retardant wrap with fire-retardant polymer layer protecting the pipe joint;
   a wall penetration at the wall,
   wherein said the pipe pass through, is protected by a layer of fire-retarding wrap with fire-retardant polymer layer secured to the wall with a bolt, washer and wall anchor
2. The cladded pipe system of claim 1, wherein the pipe is supported by a C-channel or pipe hanger and strut rod**,** secured to the soffit/wall/floor of the building.
3. The cladded pipe system of claim 1, wherein the pipe is protected by a fire-retardant polymer layer
4. The cladded pipe system of claim 3, wherein the fire-retardant polymer layer wrap around the pipe
5. The cladded pipe system of claim 1, wherein the fire-retardant wrap secures the fire-retardant polymer to the pipe.
6. The cladded pipe system of claim 5, wherein the fire-retardant wrap is secured to the pipe by cupped head welding pin.
7. The cladded pipe system of claim 5, wherein the fire-retardant wrap is sealed to prevent heat and pressure penetration.
8. The cladded pipe system of claim 6, wherein the cupped head welding pin is secured to the pipe by a welding gun.
9. The cladded pipe system of claim 7, wherein the sealant is by fire-retardant polymer.
10. The cladded pipe system of claim 1, wherein an overlaying fire-retardant wrap and fire-retardant polymer layer protect the pipe joint.
11. The cladded pipe system of claim 10, wherein the overlaying fire-retardant wrap is sealed to prevent heat and pressure penetration.
12. The cladded pipe system of claim 10, wherein the overlaying fire-retardant wrap is secured with steel band.
13. The cladded pipe system of claim 11, wherein the sealant is by fire-retardant polymer.
14. The cladded pipe system of claim 12, wherein the steel band is tightens and locked with a buckle.
15. The cladded pipe system of claim 1, wherein a layer of fire-retarding wrap with fire-retardant polymer layer protects the wall penetration.
16. The cladded pipe system of claim 15, wherein the fire-retarding wrap with fire-retardant polymer layer is secured to the wall with bolt, washer and anchor.